

**Before the  
Federal Communications Commission  
Washington, DC 20554**

In the Matter of	)	
	)	
Expanding Flexible Use in Mid-Band Spectrum	)	GN Docket No. 17-183
Between 3.7 and 24 GHz	)	

**REPLY COMMENTS OF MICROSOFT CORPORATION**

Microsoft Corporation (“Microsoft”) hereby submits its Reply Comments in response to certain of the Comments filed in the above-captioned Notice of Inquiry.<sup>1</sup>

**I. Introduction And Summary**

In its Comments, Microsoft urged the Federal Communications Commission (“Commission” or “FCC”) to issue expeditiously a Notice of Proposed Rule Making (“NPRM”) that: (1) extends the upper limit of the Citizens Broadband Radio Service (“CBRS”) from 3700 to 3800 MHz; (2) authorizes a new licensed fixed wireless point-to-multipoint (“P2MP”) broadband service in the 3800 – 4200 MHz band under the Commission’s Part 101 rules using the approach proposed by the Broadband Access Coalition (“BAC”) ; (3) amends its rules to improve the utility of the 5 GHz bands requiring Dynamic Frequency Selection (“DFS”) for commercial low power devices; and (4) proposes authorizing unlicensed broadband use across the entire 5925 - 7125 MHz (“6 GHz”) frequency band and seeks comment on technical rules that protect existing licensees, leveraging the Commission’s U-NII framework to the greatest

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<sup>1</sup> *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Inquiry, GN Docket No. 17-183, FCC 17-104 (rel. Aug. 3, 2017). Comments were filed on October 2, 2017 in GN Docket No. 17-183.

extent possible. We agree with the Commission that it is critical to identify new mid-band spectrum to meet the growing demand for wireless broadband.

With respect to the 3700 - 4200 MHz band (the “Band”), Microsoft noted that the decades-old “full-band, full-arc” coordination policy overprotects Fixed-Satellite Service (“FSS”) downlinks and results in severe underutilization of the Band.<sup>2</sup> In order to maximize sharing of the Band, Microsoft urged the Commission to update its FSS licensing database and implement more realistic protection levels for C-band satellite earth stations.<sup>3</sup>

## **II. There Is Broad Agreement That The 3.7 – 4.2 GHz Band Is Underutilized And That The Commission Should Take Action To Increase Utilization**

Commenters broadly agreed that the Band is underutilized “primarily as a result of the antiquated “full-band, full-arc” licensing policy which requires protection for every satellite earth station across the entire 500 MHz of the 3700 – 4200 MHz band” regardless of how much of that band the satellite earth station is actually using.<sup>4</sup> Microsoft agrees with the Dynamic Spectrum Alliance (“DSA”) that “... most of the [C-band’s] 500 MHz of capacity lies fallow in most local areas across the country.”<sup>5</sup> As set forth below, commenters provided specific suggestions for increasing utilization of the Band.

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<sup>2</sup> Microsoft Comments at 3.

<sup>3</sup> *Ibid.*

<sup>4</sup> Comments of the Broadband Access Coalition (“BAC”) at 6. *See also*, Comments of Verizon at 12 (“a robust record demonstrates that the existing “full-band, full-arc” licensing structure is spectrally inefficient”); Comments of CTIA at 8 – 9. Full-band, full-arc protection of satellite earth stations in the C-band is a long-standing Commission policy, but one that has not been codified in its rules.

<sup>5</sup> Comments of the Dynamic Spectrum Alliance (“DSA”) at 5. *See also*, Comments of Nokia at 8 – 9 (“The Commission’s special treatment for satellite spectrum coordination (“full-band, full-arc”) overstates current FSS use”).

**A. There Is Unanimous Agreement That The Satellite Earth Station Database Needs To Be Updated As Soon As Possible**

Underutilization of the Band is exacerbated by the Commission's outdated and inaccurate satellite earth station database ("IBFS"). According to Google, "approximately 29% of ... registered locations are clearly not being used for satellite services despite being registered in IBFS."<sup>6</sup> DSA urged the Commission "to act immediately to clean up the 3.7 – 4.2 GHz licensing database" and "not wait for the resolution of this proceeding to improve the accuracy of the earth station registration data."<sup>7</sup> As Google noted "[o]nce the FSS registrations have been updated, IBFS will accurately reflect greater opportunities to share the C-band with [Fixed Broadband Access] systems."<sup>8</sup> Microsoft agrees with DSA that "[u]pdating FSS earth station registrations with complete and accurate location, frequency use, and other information to enable dynamic sharing is a prerequisite to more efficient utilization of the [B]and ...."<sup>9</sup> Even the Satellite Industry Association ("SIA") agrees that "a clean-up of the Commission's [IBFS] database ... is appropriate to ensure its ongoing accuracy and completeness."<sup>10</sup>

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<sup>6</sup> Comments of Google LLC and Alphabet Access ("Google") at 4. *See also*, Nokia Comments at 8 ("FSS use of the 3.7 – 4.2 GHz band has been in steady decline and is over-represented in the Commission's database"); CTIA Comments at 8 ("the band today is extremely underutilized and inefficiently used ...."); T-Mobile Comments at 3 ("Existing operations in the 3.7 – 4.2 GHz band are limited and declining ....").

<sup>7</sup> DSA Comments at 7. *See also*, AT&T Comments at 9 ("the FCC should ... conduct[ ] a rigorous audit of the C-band ....").

<sup>8</sup> Google Comments at 6.

<sup>9</sup> DSA Comments at 6; *accord* BAC Comments at 8 - 9.

<sup>10</sup> Opposition of SIA, RM-11791 (filed Aug. 7, 2017), at 8. Microsoft has no objection to SIA's proposal that the Commission offer "amnesty" to earth station operators that correct inaccurate information in the database in a timely basis in a manner specified by the Commission. *Accord*, BAC Comments at 9.

Several commenters assert that thousands of receive-only earth stations are unregistered,<sup>11</sup> for a variety of reasons, including: registration is voluntary; the antenna is too small to comply with the gain mask specified in the FCC rules;<sup>12</sup> and the Commission generally does not allow registration of receive-only antennae smaller than 4.5 meters in diameter.<sup>13</sup> SIA noted that “the evidence suggests that a large number of C-band users have chosen not to go through the registration process because the benefits of registration do not justify the costs.”<sup>14</sup> Receive-only registration provides interference protection from later-filed terrestrial FS links.<sup>15</sup> Currently, there are only about 100 FS links licensed in the Band across the nation, and the expectation is that the number of fixed links in the band will continue to decline. While it may be economically rational for earth station operators to want to save the \$435 registration fee per earth station, the result is bad public policy. The bottom line is that the Commission does not have a comprehensive picture of overall FSS C-band usage.

Microsoft believes that there is an urgency for the Commission to close this gaping blind spot in its knowledge of spectrum utilization in the C-band through a Public Notice. We propose the Commission provide these unregistered earth stations a reasonable but finite

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<sup>11</sup> See, e.g., SES Comments at 6, NAB Comments at 3, NCTA Comments at 3, North American Broadcasters Association Comments at 4, Intelsat and Intel Comments at 10.

<sup>12</sup> North American Broadcasters Association Comments at 5.

<sup>13</sup> NAB Comments at 3.

<sup>14</sup> SIA Comments at 18.

<sup>15</sup> SIA Comments at 19.

amount of time to register in order to receive protection under Section 25.131(b) of the Commission's rules.

#### **B. More Realistic Protection Levels Need To Be Developed And Implemented**

The Commission needs to develop more realistic protection levels for satellite earth stations. In particular, Microsoft agrees with Nokia that real-world attenuation from natural and man-made obstacles, such as terrain, foliage and buildings, must be taken into account “when determining the potential interference into FSS earth stations from terrestrial systems.”<sup>16</sup> In addition, Microsoft encourages the Commission to review the interference protection levels accorded to FSS earth stations. As Nokia noted, “[t]hese criteria were self-derived by the FSS industry at the ITU decades ago, with little or no consideration of other services, and modern spectrum use and management.”<sup>17</sup>

Microsoft also agrees with Federated Wireless that in its CBRS proceeding the Commission has already conducted an evaluation and determined the protection criteria necessary to enable co-channel and adjacent channel terrestrial use of C-band FSS spectrum.<sup>18</sup> The Commission might consider using the protection requirements for FSS operations to enable sharing in the CBRS band as the basis for protection requirements for FSS to enable sharing in the 3700 - 3800 MHz and 3800 - 4200 MHz ranges.

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<sup>16</sup> Nokia Comments at 9.

<sup>17</sup> *Ibid.*

<sup>18</sup> Federated Wireless Comments at 3.

### **III. The Commission Should Move Expeditiously To Enable Shared Use Of The Band**

In view of broad agreement in the record, Microsoft urges the Commission to expeditiously issue a Notice of Proposed Rulemaking to enable shared use of the Band.

Microsoft does not support mandatory clearing of FSS earth stations from the 3700 – 4200 MHz band. It is an approach some commenters have proposed, but as an even a longer list of commenters have cited, it would be a lengthy, arduous, and uncertain process at best.

#### **A. The Commission Should Expand The CBRS Band To 3800 MHz**

Microsoft believes the Commission should propose rules to segment the 3700 - 4200 MHz band and extend the upper limit of the CBRS band to 3800 MHz. The CBRS rules would then apply between 3550 - 3800 MHz. Microsoft envisions some form of spectrum auction for up to six priority access licenses (“PALs”) in a to-be-determined geographic area for spectrum between 3700 – 3800 MHz, with the remaining spectrum set aside for General Authorized Access (“GAA”). Any P2MP fixed wireless service operating in the 3700 – 3800 MHz band would thus operate under the Part 96 rules and not the Part 101 approach that we support for the 3800 – 4200 MHz band.

Microsoft is intrigued by the Intelsat and Intel proposed market-based mechanism for making spectrum available for localized mobile operations, which could be viewed as complementary to a PAL auction.<sup>19</sup> One possibility is that once the PALs are assigned in a geographic area, the PAL license holders can negotiate with FSS and FS providers, and other stakeholders within the license area regarding the local clearing of spectrum.

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<sup>19</sup> Intelsat and Intel Comments at 7.

**B. There Are Practical Means For Fixed Wireless P2MP Service To Share The Band With FSS Downlinks in the 3800 - 4200 MHz Range**

Microsoft reiterates its strong support for creating a new fixed wireless broadband service in the Band as an important tool for closing the rural broadband digital divide.<sup>20</sup>

We believe a technology model that uses a combination of TV White Spaces spectrum, satellite coverage, and other fixed wireless frequencies, depending on population density, can significantly reduce the initial capital costs and on-going operating costs of providing affordable last mile coverage to rural America.<sup>21</sup>

Microsoft was very heartened by the joint comments from traditional wireline providers Frontier, Windstream, and Consolidated Communications regarding their interest in operating a P2MP service as another tool in the toolbox to extend their respective wireline networks and reach more locations or upgrade underserved locations with faster speeds.<sup>22</sup>

Microsoft supports the overall contour of the BAC petition, which proposed specific and concrete rule changes that will enable the rapid introduction of P2MP fixed wireless broadband service into the Band while protecting FSS downlinks. Microsoft agrees with Google that “the 3.7 – 4.2 GHz band is well-suited to support shared point-to-point and point-to-multipoint broadband access in the near term without precluding mobile use in the future.”<sup>23</sup> And as several commenters point out, the Band is severely underutilized, as the typical FSS earth station may be using less than 50 MHz of the 500 MHz available.<sup>24</sup>

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<sup>20</sup> Microsoft Comments at 2.

<sup>21</sup> Microsoft Comments at 7.

<sup>22</sup> Combined Comments of Frontier, Windstream, and Consolidated Communications at 1.

<sup>23</sup> Google Comments at 2 (emphasis deleted).

<sup>24</sup> BAC Comments at 6; Nokia Comments at 9.

Microsoft considers the BAC proposal, to permit FSS operators to retain their current licenses or registrations to operate across the entire 3700 – 4200 MHz band<sup>25</sup> while limiting interference protection to the frequencies on which the earth station is operating at a given time, as a good starting point.<sup>26</sup> In this way, FSS providers and their customers would retain flexibility to address several business and service scenarios identified in various comments.

### **C. Automated Frequency Coordination Will Maximize Shared Use Of The Band**

In its Comments, Microsoft recognized that “the simple and proven mechanism proposed [by BAC] under Part 101 ... will allow the new fixed broadband service to be initiated immediately.”<sup>27</sup>

However, [Microsoft believes] that that the Commission should require the coordination process to be automated through a database in relatively short order after the new service is authorized through a multi-stakeholder process, including FSS operators, and with a date certain transition.<sup>28</sup>

Microsoft agrees with Google that an “automated admission system would modernize the manual coordination process that is now codified in Part 101 ....”<sup>29</sup> As Google noted, “interference calculations ... are particularly straightforward because the locations of both the earth stations and [Fixed Broadband Access] systems would be well-known, and their operational parameters well-characterized.”<sup>30</sup> Microsoft also agrees with DSA, which urged the

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<sup>25</sup> In Microsoft’s proposal, this only applies to 3800 – 4200 MHz.

<sup>26</sup> BAC Comments at 8.

<sup>27</sup> Microsoft Comments at 9.

<sup>28</sup> Microsoft Comments at 9.

<sup>29</sup> Google Comments at 10.

<sup>30</sup> Google Comments at 9 and 11.



Commission to “leverage dynamic spectrum sharing techniques to enable more intensive use of the [B]and.”<sup>31</sup>

#### **IV. The Commission Should Revise The Rules Governing The DFS Bands To Enable Greater Use**

Both the Wi-Fi Alliance and NCTA identify some of the challenges of unlicensed operations in the DFS bands.<sup>32</sup> In particular, NCTA states:

The listen-detect-and-vacate method limits the utility of DFS bands for certain applications, including those that are most susceptible to loss of service, such as video calling, online gaming, VPN connections, or wireless augmented reality / virtual reality.<sup>33</sup>

Microsoft’s comments described our interest in enabling future generations of the Xbox One to access the 5 GHz DFS bands and the challenges we see for operating even a 10 mW indoor device under the current DFS rules, particularly for the prescribed channel access check mechanism. To increase utilization of the DFS bands by consumer devices, Microsoft urges the Commission to modernize its rules for operations in the 5 GHz DFS bands for low-power devices.

#### **V. The Commission Should Adopt An NPRM That Proposes To Permit Unlicensed Broadband Operations In The Entire 6 GHz Band (5925-7125 MHz)**

Microsoft is filing joint Reply Comments with Apple Inc., Broadcom Corporation, Cisco Systems, Inc., Facebook, Inc., Google LLC, Hewlett-Packard Enterprise, Intel Corporation,

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<sup>31</sup> DSA Comments at 8.

<sup>32</sup> Wi-Fi Comments Alliance at 9-11; NCTA Comments at 11.

<sup>33</sup> NCTA Comments at 11.

Mediatek Inc., and Qualcomm Incorporated. We refer the Commission to these Reply Comments.

## **VI. Conclusion**

For the reasons set forth above, Microsoft urges the Commission to extend the CBRS band to 3800 MHz; authorize a new licensed fixed wireless P2MP broadband service in the 3800 – 4200 MHz band under the Commission’s Part 101 rules; amend its rules to improve use of the 5 GHz band; and move forward with the development of service and technical rules authorizing unlicensed broadband use of the 6 GHz band.

Respectfully submitted,

### **MICROSOFT CORPORATION**

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